HIGH RESISTANCE STEEL BAND OR SHEET AND METHOD FOR THE PRODUCTION THEREOF

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WO9841664 (A1)
DE3007560 (A1)
US4336080 (A)
JP4268016 (A)
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Abstract of **WO 0109396 (A1)**

The invention relates to a high resistance steel band or sheet having a substantially ferritic or martensitic structure, with a martensitic part comprised between 4 and 20 %. In addition to the iron and the impurities resulting from the steel-making process, said steel band or sheet contains (in mass %) 0.05 - 0.2 % C, </= 1,0 % Si, 0,8 - 2,0 % Mn, </= 0,1 % P, </= 0,015 % S, 0,02 - 0,4 % Al, </= 0,005 % N, 0,25 - 1,0 % Cr, 0,002 - 0,01 % B. Preferably, the martensitic part is comprised between 5 % and 20 % of the substantially ferritic and martensitic structure. The inventive high resistance steel band or sheet which is made of a dual-phase steel exhibits good mechanical and technological properties, even after an annealing process including an over-aging treatment. The invention also relates to a method for producing said steel band or sheet.

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High-solid steel strip or sheet metal and
Method to its production the invention relates to a high-solid steel strip oderblech with a predominant ferritic-martensitic structure and a method to its production.

In the frame of the use of steel strips and steel sheets of the preceding mentioned type continuous high becoming requirements become provided to the versatility of the utility and the performance characteristics. Thus ever better mechanical properties of such steel strips become and sheet metals required. This concerns in particular the transforming ability of such materials.

A good transformable steel strip or sheet metal is characterised by high r of values, high standing for a good Erichsen index, n of values standing for a good stretch-forming barness and high, positive flat strain properties indicative stretch values. Just as characteristic for a good stretch-forming barness is a low yield point ratio, which becomes from quotient of yield strength and tensile strength the formed.

To the general requirement after increased strength likewise increased efforts come into Range of the lightweight construction. In this field purposes the weight savings become sheets with reduced sheet thickness used. The firmness loss accompanying construction dependently with the reduction of the sheet thickness of the sheets themselves can become balanced by an increase of the strength.

However an increase of the strength pulls naturally a decrease of the forming capacity.

Primary object of the development of materials of the kind here standing in speech is therefore the increase of the strength with simultaneous as small a decrease of the forming capacity as possible.

Many high-solid, micro-alloyed or polarize-craved steels with good cold forming capacity are in the pig iron for steelmaking purposes material sheets 093 and 094 indicated. Partially these steels exhibit beacon Hardening properties.

The latters can be obtained in particular by application of a run glow procedure, which becomes coupled with a melting also finishing process if necessary.

Besides one has successful attempted in the practice to increase the strength of steels with simultaneous significant higher forming capacity by an increase alloy contents. Complementary ones or alternative could be improved these properties by accelerated cooling rates during the hot-rolling process or run glow process. The disadvantage of this proceeding consists however of the fact that become caused by the increased contents of alloying elements and the mechanism and the operation of the required cooling equipments high costs.

Conventional run glow plants for sheet metal are rear Glüh-und cool down-hurry with an obsolescence furnace provided. In such a obsolescence zone a " obsolescence " of the steel strip of or sheet metal takes place, by the processed steel strip or sheet metal in a temperature range < held becomes. This holding with a temperature of up to 500 C of effected carbon solved with low alloyed, soft steels a large elimination as carbide. The mechanical-technological properties of the steel strip of or sheet metal positive are beinflusst by this elimination of carbide. With the production of dual phase steels in run glow plants it can come however with passes of the obsolescence zone to undesirable starter effects in the martensite.

The object of the invention consists of creating a high-solid steel strip or sheet metal prepared from a dual phase steel which inclusion of an obsolescence treatment bottom after pass of a glow process possesses good mechanical-technological properties. Beyond that a method is to become the production of such a band or sheet indicated.

This object becomes on the one hand by a high-solid steel strip or sheet metal dissolved, which exhibits a predominant ferritic-martensitic structure, at which the martensite portion between 4 to 20% amounts to, whereby the steel strip or sheet metal beside Fe and impurities (in mass %) erschmelzungsbedingten 0.05 0.2% C, < 1.0% SI, % Mn, 0.1% P, # 0, 015% S, 0,02 0.4% A1, 0.005% N, 0.251.0% CR, 0,002 0.01% B contains. Preferably the March NIST portion amounts to approximately 5% to 20% of the predominant martensitic-ferritic structure.

A steel strip or a steel sheet according to invention exhibits high strength of at least 500 N/mm2 with simultaneous good transforming abilities, without are required in addition particularly high contents of certain alloying elements. For the increase of the strength the invention already falls back on the actual with steels for hot-rolled bands and forgings known transformation-affecting effect of the element boron. The firmness-increasing effect of the boron will is added thereby thereby ensured, da# to the steel plant material at least according to invention an alternative Nitridbildner, preferably an aluminium and a complementary Ti. The effect of the addition at titania and aluminium consists of the fact that they bind the nitrogen contained in the steel, so that boron stands to the formation from hard carbides to the order.

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Supported one by the necessary present Cr content becomes in this way a higher firmness level achieved than with comparable steels, which are in conventional manner composed.

As mentioned, the firmness-increasing effect of borons is in steels in the conditions of the technique already discussed in connection with the production of hot-rolled strip or forgings. Thus for example the German Patent Laid open DE describes 197 19 546 A1 a hot-rolled strip of highest strength, which Ti in an amount is zulegiert alternatively, for a stoichiometric Setting of the nitrogen present in the steel is sufficient.

In this way the likewise admitted portion of borons before the connection at nitrogen becomes protected. Thus the boron unobstructed can contribute to the strength increase and Durchhärtbarkeit of the steel. The other the production high-solid, hot-rolled dual phases of a steel described in the German Patent Laid open DE 30 07 560 A1, which is boron in a portion of 0,0005 to 0.01 weight % added, becomes. The purpose of the borons addition exists in this case in the delay of the ferrite pearlite conversion.

Surprising one turned out that with a high-solid steel strip or steel sheet according to invention the portion martensite also of the obtained remains if the respective material becomes exposed after the cold rolling of an annealing treatment with subsequent cooling and obsolescence or a melting also refinement. The yield strength of a band or a sheet according to invention lies between 250 N/mm2 and 350 N/mm2. The tensile strength amounts to 500 N/mm2 to more than 600 N/mm2, in particular to 650 N/mm2. The material is stretch borderstretch-free in the undressierten state practical (ACRES 1.0). A steel strip according to invention or sheet metal exhibits thereby properties and features, how they could not become so far achieved for low alloy steels.

An other advantage of steels according to invention exists in their resistance against starter effects. The problem in particular existing with conventional composed two-phase steel that the martensite portion is started during an obsolescence treatment and it on these Manner to a decrease of the strength comes, becomes with composed according to invention steels by the presence of chromium avoided.

Prefered one exhibits a steel strip according to invention, also ON oderblech additional Ti content from at least 2.8 x = portion of N in mass %. That can become Al content on a range of 0,02-0,05 mass % limited. With this aspect of the invention the nitrogen contained in the steel A1 becomes offered not only as Nitridbildner, but it is for the stoichiometric setting of the nitrogen sufficient amount at Ti present. Is present against it if no Ti in the steel, then that should Al content of the steel strip or - sheet metal from 0,1 to 0.4 mass % amount to. By the presence of aluminium and/or titanium first relatively coarse-grained TiN and/or A1N form with cooling. Since titania and aluminium are more affine to nitrogen as borons, are available the present boron content for the carbide formation. This the affected mechanical properties of steels according to invention favorable as this the case is, if becomes excreted with absence of sufficient titanium or aluminium contents for example first fine-grained BN.

A possibility of the production of a steel strip according to invention of or sheet metal consists of producing the steel strip or sheet metal by cold rolling of a hot-rolled strip. Alternative one can become however also a thin hot-rolled strip easily cold rolling a steel strip according to invention processed, if its thickness for the subsequent treatment is sufficient reduced. Such Hot-rolled strip can become for example on a casting rolling plant prepared, in which a poured stealing rank of immediate to a hot-rolled strip small thickness is rolled out. Independent one of it, which is walked on path of the production of the steel strip of or sheet metal, becomes the preceding object mentioned regarding the manufacturing method thereby dissolved that the steel strip is submitted or - sheet metal in the continuous furnace of an annealing treatment, with that the annealing temperature between 750 C and 870 C, preferably between 750 C and 850 C, lies, and that the glowed steel strip or sheet metal subsequent of the annealing temperature with a cooling rate of at least 20 C/s and at the most 100 C/s cooled becomes.

With the invention process at least A1 leaves itself and if necessary on basis of a C-Mn-steel, to the boron and. complementary Ti as Nitridbildner added is, a steel strip manufacture, which possesses also bottom indicated Glüh-und cooling conditions that desired high martensite portion from approximately 5% to 20%. Differently than with conventional proceeding it is not required to cool the steel strip or steel sheet down to the formation of martensite in the structure after the run glowing with an high cooling rate. Instead of its ensured solved borons free in the lattice that the martensite formation begins in such a manner also with low cooling rates that a predominant ferrite/martensite structure with the dual-phasetypical characteristic combinations develops.

It is found that this effect already is with a portion of 0,002 to 0.005% borons effective. Thus the possible invention the production of a high-solid steel strip or steel sheet, without costly apparatuses the cooling used or large amounts at alloying elements used to become to have.

The other is found that generated according to invention steels no considerable characteristic degradations by starter effects in the martensite with the pass of the obsolescence experienced. In such cases, becomes performed in which no melting also refinement of the steel strip of or sheet metal, the obsolescence can last 300 C up to 300 s and the treating temperature to 400 C amount to. Against it if a melting also refinement, for example a hot-dip galvanizing, becomes performed, then the holding time should amount to during a possible obsolescence when galvanizing up to 80 s and lie the treating temperature between 420 C and 480 C. Beyond that the properties generated of a according to invention, galvanized steel strip of or sheet metal can be improved still by the fact that after the galvanization an actual known "Galvannealing" - treatment performed becomes. With a such treatment hot-dip galvanized sheet or band after the Schmelztauchen one glows. Depending upon application it can be convenient beyond that to train the steel strip or sheet metal final.

Subsequent one becomes the invention on the basis embodiments more near explained.

In table 1 are the alloy contents and the technological-mechanical characteristics of ACRES (Stretching border stretch), ReL (lower yield strength), Rm (tensile strength), ReL/Rm (yield strength ratio) and A80 (elongation at break) for steel strips according to invention A1-A4 indicated. The corresponding indications are confronted to comparison steel strips B1-B5, C1-C5, D1-D4 and E1 in the same table.

With all in table 1 indicated and to the comparison indicated steel strips according to invention A1-E1 the C content lies between 0,07 and 0,08 mass %. With the aforementioned comparison steel strips B1-B5 the Mn content was consulted from 1,5-2,4 mass % to the interference of the conversing attitude. In the case of the comparison steel strips C1-C5 element combinations made of SI (around 0,4 mass %) and Mn (1.5-2.4 mass %) are and in the case of the comparison steel strips D1-D4 a combination contents of SI (to 0.7 mass %), Mn (1.2-1.6 mass %) and CR (0.5 mass %) of the used to the same purpose. With the comparison steel strip E1 is additional Mo provided.

With the steel strips according to invention A1-A4 is beside likewise used SI (to 1.0 mass %) and Mn (0.8-1.5 mass %) the strong transformation-retarding property of the boron used. In order to avoid the formation from boron nitrides to, with Ti as Nitridbildner the nitrogen was tied. The for this purpose present Ti content was with N-held ones from 0,004 to 0.005 mass % around 0,03 mass %, during that B-content approx. 0,003 mass % amounted to.

After the Erschmelzung of that steels A1-A4 and pouring in each case a slab a made heating of the respective slab on 1170 C. Then a hot-rolled strip with a thickness of 4.2 mm became rolled from the heated slab. The final rolling temperature was with 845-860 C. The hot-rolled strip was gehaspelt subsequent with a temperature of 620 C, whereby the middle Coilabkühlung amounted to 0.5 C/min. Subsequent one was pickled the hot-rolled strip and on a thickness of 1.25 mm of cold rolled.

The respective cold rolled steel strip was submitted of a run annealing, itself at a standard driving fashion with obsolescence for low-alloy, soft steels the oriented. Substantial flagstones these Glüh-und obsolescence treatment were an annealing temperature during

the run glowing of 800 C and a split cooling with final passes of the obsolescence zone. The cooling made first on 550-600 C with a cooling rate of approx. 20 C/s. Subsequent one became with a cooling rate of approx. 50 C/s on 400 C cooled. The final obsolescence treatment existed in holding in the temperature range of 400300 C for a time of 150 S.

The mechanical-technological characteristics after a conventional run annealing in the undressierten state, indicated in table 1 for prepared the according to invention steel strips A1 to A4, occupy the advantageous properties prepared of the according to invention steel strips and/or - sheet metals in the comparison with the additional listed high-solid alloy concepts of the comparison steel strips. The absence of a stretching border stretch in the undressierten state with the steel strips according to invention refers significant to the favorable ferrite/martensite structure. The elongation limits lie bottom 300 N/mm2 and the mechanical properties between 530 N/mm2 and 630 N/mm2.

Thereby the respective steel strip A1-A4 shows a good solidification behavior, which itself also in a very low with plastic deformation yield strength ratio (Re/Rm < 0,5) expresses. The elongation at rupture values lie for strength of 540-580 N/mm2 between 27 and 30%; for approx. 630 N/mm2 with still good 25%. The mechanical properties are altogether isotropic.

All comparison steel strips with strength, which steel strips according to invention on the level lie, show worse stretch values in the predominant number of the cases at above all significant raised yield strength extension values. This brings a more unfavorable solidification behavior with itself.

With the comparison steel strips mass % (comparison steel strips B4, B5, C5) stretching border stretch liberty can be realized only by very high Mn-contents of more than 2.1. Also significant higher mechanical properties are more detectable.

Simultaneous ones become however more unfavorable stretching border stretch conditions and smaller elongations achieved.

In table 2 are the alloy contents and the technological-mechanical characteristics of ACRES (stretching border stretch), ReL (lower yield strength), Rm (tensile strength), ReL/Rm (yield strength ratios) and Aeo (Elongation at break) for a steel strip according to invention F1 indicated. To the production of the steel strip F1 is first an Ti-B-alloyed C-Mn-steel erschmolzen and subsequent cold rolled in conventional manner warm-und.

Subsequent one is glowed the cold rolled steel strip flat steel bar and by a hot-dip galvanizing plant passed.

Annealing became performed with 870 C. A retaining phase followed with 480 C for 60 seconds. The zinc bath temperature amounted to 460 C. The operating conditions are in detail in table 3 indicated. The properties of in such a manner melt-also-improved, final trained steel strip flat steel bar lie in the range of the properties of the values according to invention indicated in table 1.

In table 4 are also for steel strips according to invention G11-G14 the alloy contents and the technological-mechanical characteristics of ACRES (stretching border stretch), ReL (lower yield strength), Rm (tensile strength), ReL/Rm (yield strength ratios) and A80 (elongation at break) for steel strips according to invention A1-A4 indicated. The steel strips G11-G14 were submitted of based in each case composition generated and conventional Warm-und cold-rolling process identical on a steel.

The cold rolled steel strips G11 and G12 went through a run glow treatment, while the steel strips G13 and G14 of a hot-dip galvanizing treatment were submitted. The respective operating conditions are in table 5 indicated. With annealing temperatures of 780-800 C the tensile strength of the steel strips G11-G14 lies with approximately 500 N/mm2. The flow beginning is to a large extent # 1.0%) .streckgrenzdehnungsfrei (ACRES
EMI14.1

Steel <September> C <SEPTEMBER> SI <September> Mn <September> P <SEPTEMBER> S <SEPTEMBER> Aluminium <September> N <SEPTEMBER> CR <September> Mo <September> Ti <September> B <SEPTEMBER> Acres <September> RleL
<tb> bound
<tb> [Masee %] <September> [%] <September> [N/mm2]
<tb> A1 <September> 0.08 <September> 0.01 <September> 1.48 <September> 0.01 <September> 0.012 <September> 0.04 <September> 0.004 <September> 0.5 <September> - <September> 0.028 <September> 0.003 <September> 0 <September> 258
<tb> A2 <September> 0.08 <September> 0.39 <September> 1.23 <September> 0.01 <September> 0.012 <September> 0.03 <September> 0.004 <September> 0.5 <September> - <September> 0.028 <September> 0.0032 <September> 0 <September> 252
<tb> A3 <September> 0.08 <September> 0.79 <September> 1.24 <September> 0.009 <September> 0.012 <September> 0.03 <September> 0.005 <September> 0.51 <September> - <September> 0.029 <September> 0.0032 <September> 0 <September> 260
<tb> A4 <September> 0.08 <September> 0.78 <September> 1.46 <September> 0.009 <September> 0.013 <September> 0.04 <September> 0.004 <September> 0.51 <September> - <September> 0.029 <September> 0.003 <September> 0 <September> 266
<tb> B1 <September> 0.07 <September> 0.01 <September> 1.53 <September> 0.012 <September> 0.01 <September> 0.03 <September> 0.005 <September> - <September> - <September> - <September> - <September> 3.6 <September> 366
<tb> B2 <September> 0.07 <September> 0.03 <September> 1.87 <September> 0.011 <September> 0.013 <September> 0.02 <September> 0.004 <September> - <September> - <September> - <September> - <September> 1.2 <September> 350
<tb> B3 <September> 0.07 <September> 0.01 <September> 1.95 <September> 0.011 <September> 0.01 <September> 0.03 <September> 0.004 <September> - <September> - <September> - <September> - <September> 1.0 <September> 350
<tb> B4 <September> 0.08 <September> 0.02 <September> 2.14 <September> 0.012 <September> 0.009 <September> 0.03 <September> 0.003 <September> - <September> - <September> - <September> - <September> 0 <September> 389
<tb> B5 <September> 0.08 <September> 0.03 <September> 2.4 <September> 0.011 <September> 0.011 <September> 0.04 <September> 0.004 <September> - <September> - <September> - <September> - <September> 0 <September> 522
<tb> C1 <September> 0.08 <September> 0.42 <September> 1.53 <September> 0.019 <September> 0.012 <September> 0.03 <September> 0.005 <September> - <September> - <September> - <September> - <September> 3.6 <September> 428
<tb> C2 <September> 0.07 <September> 0.38 <September> 1.63 <September> 0.011 <September> 0.011 <September> 0.03 <September> 0.003 <September> - <September> - <September> - <September> - <September> 3.0 <September> 420
<tb> C3 <September> 0.08 <September> 0.35 <September> 1.93 <September> 0.012 <September> 0.013 <September> 0.03 <September> 0.004 <September> - <September> - <September> - <September> - <September> 1.2 <September> 407
<tb> C4 <September> 0.07 <September> 0.32 <September> 2.11 <September> 0.011 <September> 0.011 <September> 0.03 <September> 0.004 <September> - <September> - <September> - <September> - <September> 1.1 <September> 416
<tb> C5 <September> 0.08 <September> 0.40 <September> 2.38 <September> 0.011 <September> 0.009 <September> 0.03 <September> 0.004 <September> - <September> - <September> - <September> - <September> 0 <September> 477

<tb> D1 <September> 0.07 <September> 0.01 <September> 1.26 <September> 0.009 <September> 0.01 <September> 0.03 <September> 0.003 <September> 0.49 <September> - <September> - <September> - <September> 5.0 <September> 370
<tb> D2 <September> 0.08 <September> 0.01 <September> 1.60 <September> 0.01 <September> 0.013 <September> 0.04 <September> 0.005 <September> 0.3 <September> - <September> - <September> - <September> 3.0 <September> 358
<tb> D3 <September> 0.07 <September> 0.01 <September> 1.46 <September> 0.01 <September> 0.011 <September> 0.02 <September> 0.004 <September> 0.48 <September> - <September> - <September> - <September> 2.1 <September> 311
<tb> D4 <September> 0.08 <September> 0.73 <September> 1.41 <September> 0.01 <September> 0.01 <September> 0.01 <September> 0.03 <September> 0.005 <September> 0.56 <September> - <September> - <September> - <September> 1.7 <September> 327
<tb> E1 <September> 0.08 <September> 0.03 <September> 1.35 <September> 0.011 <September> 0.009 <September> 0.04 <September> 0.004 <September> 0.51 <September> 0.32 <September> - <September> - <September> 2.5 <September> 341
<tb> Table 1
EMI15.1

Steel <September> C <SEPTEMBER> SI <September> Mn <September> P <SEPTEMBER> S <SEPTEMBER> Aluminium <September> N <SEPTEMBER> CR <September> Mo <September> Ti <September> B <SEPTEMBER> Acres <September> ReL
<tb> bound
<tb> [mass %] <September> [%] <September> [N/mm2]
<tb> F1 <September> 0.08 <September> 0.04 <September> 1.5 <September> 0.013 <September> 0.014 <September> 0.06 <September> 0.01 <September> 0.52 <September> - <September> 0.029 <September> 0.0031 <September> 0 <September> 278
<tb> Table 2
EMI15.2

Steel <September> Preheater <September> Annealing furnace <September> Cooling zone <September> Trunk <September> Zinkbad <September> Belt speed
<tb> bound
<tb> [C] <SEPTEMBER> [m/min]
<tb> F1 <September> 830 <September> 870 <September> 480 <September> 325 <September> 460 <September> 70
<tb> Table 3
EMI16.1

Steel <September> C <SEPTEMBER> SI <September> Mn <September> P <SEPTEMBER> S <SEPTEMBER> Aluminium <September> N <SEPTEMBER> CR <September> Mo <September> Ti <September> B <SEPTEMBER> Acres <September> ReL <September> Rm
<tb> bound
<tb> [mass %] <September> [%] <September> [N/mm2] <September> [N/mm2]
<tb> G11 <September> 0.072 <September> 0.09 <September> 1.49 <September> - <September> 0.01 <September> 0.103 <September> 0.0047 <September> 0.5 <September> - <September> - <September> 0.0045 <September> 0 <September> 241 <September> 521
<tb> G12 <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> 0 <September> 295 <September> 263
<tb> G13 <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> 0.9 <September> 264 <September> 488
<tb> G14 <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> " <September> 0 <September> 267 <September> 515
<tb> Table 4
EMI16.2

Steel <September> Kind <September> Annealing temperature <September> Holding time <September> Obsolescence <September> Holding time
<tb> [C] <SEPTEMBER> [s] <September> [C] <SEPTEMBER> [S]
<tb> G11 <September> Run-glow <September> 780 <September> 75 <September> 350 <September> 180
<tb> G12 <September> " <September> 800 <September> 75 <September> 350 <September> 180
<tb> G13 <September> Hot-dip galvanizing <September> 780 <September> 75 <September> 460 <September> 60
<tb> G14 <September> " <September> 800 <September> 75 <September> 460 <September> 60
<tb> Table 5

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P A T E N T A N S P R U C H E 1. High-solid steel strip or sheet metal with a predominant ferritic-martensitic structure, at which that Martensite portion between 4% to 20% amounts to, contained beside Fe and erschmelzungsbedingten
Impurities (in mass %)
C: 0,05 0.2%,
SI: # 1.0%,
Mn: 0,8 2.0%, P: < 0,1 %,
S: 0.015%,
Aluminium: %,
N: 0.005%,
CR: %,
B: %.

2. Steel strip or sheet metal according to claim 1, D A D u r C h g e k e n n z e i C h n e t, D A ss it additional one
Ti content from at least 2.8 x, also ON = portion of N in mass %, exhibits.

3. Steel strip or sheet metal according to claim 2, D A D u r C h g e k e n n z e i C h n e t, D A ss its Al content
0,02-0,05 mass % amounts to.

4. Steel strip or sheet metal according to claim 1, D A D u r C h g e k e n n z e i C h n e t, D A ss its Al content
0,1-0,4 mass % amount to.

5. Steel strip or sheet metal after one the preceding
Claims, D A D u r C h g e k e n n z e i C h n e t, D A ss its B-content 0.002 to 0.005 mass % amounts to.

6. Method to the production of a steel strip of or sheet metal after one of the claims 1 to 5, with which the steel strip becomes or sheet metal by cold rolling of a hot-rolled strip generated, D A D u r C h g e k e n n z e i C h n e t, D A! , with that those is submitted of 3 the cold rolled steel strip or sheet metal in the continuous furnace of an annealing treatment
Annealing temperature between 750 C and 870 C, preferably between 750 C and 850 C, is appropriate, and for D A ss the glowed steel strip or sheet metal subsequent of that
Annealing temperature with a cooling rate of at least 20 C/s and at the most 100 C/s cooled becomes.

7. Method to the production of a steel strip of or sheet metal after one of the claims 1 to 5, with which the steel strip becomes or sheet metal by glowing of a thin hot-rolled strip generated, characterised in that the steel strip or sheet metal as thin hot-rolled strip in
Continuous furnace of an annealing treatment is submitted, with that the annealing temperature between 750 C and 870 C, preferably between 750 C and 850 C, is appropriate, and of D A ss the glowed steel strip or sheet metal subsequent of the annealing temperature with a cooling rate from at least 20 C/s and at the most 100 C/s cooled becomes.

8. Process according to claim 6 or 7, D A D u r C h characterized that the run-glowed, cooled down steel strip or sheet metal goes through an obsolescence zone.

9. Process according to claim 6 or 7, D A D u r C h g e k e n n z e i C h n e t, D A ss the residence times in the obsolescence zone up to 300 s amounts to and those
Treating temperature 300 C to 400 C amounts to.

10. Process according to claim 6 or 7, D A D u r C h g e k e n n z e i C h n e t, D A is submitted ss the steel strip or - sheet metal of a melting also refinement.

11. Process according to claim 10, D A D u r C h g e k e n n z e i C h n e t, D A ss for those
Galvanization and passes of the obsolescence zone required treatment time up to 80 s amounts to and those
Treating temperature between 420 C and 480 C lies.

12. Process according to claim 10 or 11, D A D u r C h g e k e n n z e i C h n e t, D A ss after the galvanization a Galvannealing treatment performed becomes.

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13. Process according to one of claims 6 to 12, by-characterized that that
Steel strip or sheet metal final is trained.